

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 May 2001 (31.05.2001)

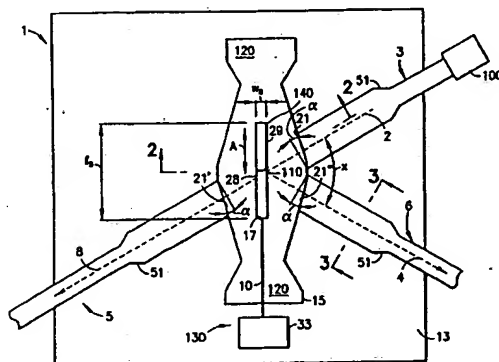
PCT

(10) International Publication Number
WO 01/38921 A3

- (51) International Patent Classification⁷: G02B 26/08
- (21) International Application Number: PCT/US00/32366
- (22) International Filing Date:
22 November 2000 (22.11.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/167,142 23 November 1999 (23.11.1999) US
- (71) Applicant: NANOVAION TECHNOLOGIES, INC.
[US/US]; 47050 Five Mile Road, North, MI 48167 (US).
- (74) Agents: ROSENTHAL, Lawrence et al.; Stroock & Stroock & Lavan LLP, 180 Maiden Lane, New York, NY 10038 (US).
- (81) Designated States (*national*): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (72) Inventors: AL-HEMYARI, Kadhair; 17370 Hidden Lake Way, Northville, MI 48167 (US). JONES, Roydn, David; 48775 Robin Court, Plymouth, MI 48170 (US). JIMENEZ, Jose, L.; 3083 Signature Boulevard, #F, Ann Arbor, MI 48103 (US).
- Published:
— with international search report
- (88) Date of publication of the international search report:
10 January 2002

[Continued on next page]

(54) Title: AN OPTICAL SWITCH HAVING A PLANAR WAVEGUIDE AND A SHUTTER ACTUATOR



(57) Abstract: An optical switch having an input waveguide and two output waveguides separated by and disposed around a trench. The input waveguide and a first output waveguide have respective optical paths defined by their respective cores; those optical paths (and cores) being coaxial with each other. Those waveguides are also separated by a trench having a medium provided therein that has a refractive index different from that of the waveguides. The input waveguide and first output waveguide are separated by a distance defined by the trench and that is insufficient to affect the transmission characteristics of an optical signal propagating from the input waveguide to the first output waveguide, even though the optical signal experiences different refractive indices as it propagates across the trench from the input waveguide to the first output waveguide. The input waveguide and a second output waveguide are arranged generally on the same side of the trench such that an optical signal passing from the input waveguide to the second output waveguide does not completely traverse the trench. Thus, even though an optical signal passing from the input waveguide to either of the first or second output waveguide encounters different refractive indices, the distance over which the optical signal must travel between the waveguides is small enough so as to not affect the optical transmission characteristics of that signal.

WO 01/38921 A3

WO 01/38921 A3



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Int. Appl. No.
PCT/US 00/32366

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G02B26/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 935 149 A (HEWLETT PACKARD CO) 11 August 1999 (1999-08-11) column 6, line 25 - line 35 column 11, line 58 - column 12, line 19 -----	1,4,7,9, 12,14, 21,22
E	US 6 195 478 B1 (FOUQUET JULIE E) 27 February 2001 (2001-02-27) abstract ----- -/--	1,21,22

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *&* document member of the same patent family

Date of the actual completion of the international search

20 April 2001

Date of mailing of the international search report

15/06/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel: (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Mollenhauer, R

INTERNATIONAL SEARCH REPORT

Int. Patent Application No

PCT/US 00/32366

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>KANAI T ET AL: "AUTOMATED OPTICAL MAIN-DISTRIBUTING-FRAME SYSTEM" JOURNAL OF LIGHTWAVE TECHNOLOGY, IEEE. NEW YORK, US, vol. 12, no. 11, 1 November 1994 (1994-11-01), pages 1986-1991, XP000485317 ISSN: 0733-8724 page 1988, paragraph III.A page 1989, paragraph IV.A</p>	1-3
A	<p>EP 0 813 088 A (HEWLETT PACKARD CO) 17 December 1997 (1997-12-17) abstract column 21, line 34 - line 54</p>	1,8
A	<p>PATENT ABSTRACTS OF JAPAN vol. 018, no. 402 (P-1777), 27 July 1994 (1994-07-27) & JP 06 118317 A (NIPPON TELEGR & TELEPH CORP), 28 April 1994 (1994-04-28) abstract figure 3</p>	1,16-18
P,A	<p>WO 00 25160 A (CORNING INC) 4 May 2000 (2000-05-04) cited in the application page 3, line 25 -page 4, line 3</p>	1,22
A	<p>SKLYAROV O K: "A TWO-POSITION LIGHTGUIDE OPTICAL SWITCH" TELECOMMUNICATIONS AND RADIO ENGINEERING, US, BEGELL HOUSE, INC., NEW YORK, NY, vol. 48, no. 7, 1 July 1993 (1993-07-01), pages 1-3, XP000539470 ISSN: 0040-2508 the whole document</p>	1,21,22
A	<p>US 4 505 539 A (AURACHER FRANZ ET AL) 19 March 1985 (1985-03-19) the whole document</p>	1,22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/32366

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0935149 A	11-08-1999	US 5960131 A	28-09-1999
		JP 11287962 A	19-10-1999
		US 6195478 B	27-02-2001
US 6195478 B	27-02-2001	US 5960131 A	28-09-1999
		EP 1089108 A	04-04-2001
		EP 0935149 A	11-08-1999
		JP 11287962 A	19-10-1999
EP 0813088 A	17-12-1997	US 5699462 A	16-12-1997
		JP 10090735 A	10-04-1998
JP 06118317 A	28-04-1994	JP 3036613 B	24-04-2000
WO 0025160 A	04-05-2000	AU 1448300 A	15-05-2000
US 4505539 A	19-03-1985	DE 3138968 A	14-04-1983
		EP 0075704 A	06-04-1983
		EP 0306604 A	15-03-1989
		JP 58130320 A	03-08-1983